

CLAIMS

1. A cooling system for use in a vehicle, comprising:
 - an electric motor comprising a housing and an airflow path through the motor for cooling the motor;
 - a fan comprising a hub having a connector for mounting to a shaft of said electric motor;
 - a plurality of fan blades extending radially from said hub;
 - a plurality of ribs situated between said connector and said hub;
 - and a circumferential flange that extends radially outward from motor case and
 - said plurality of ribs and the space between the ribs under the hub cooperating with said housing and said flange to define a channel for moving air from said airflow path into a second airflow path of air generated by said plurality of fan blades.
2. The cooling system as recited in claim 1 wherein housing comprises a front face and a side, at least a portion of at least one of said plurality of ribs is situated in operative relationship with said side.
3. The cooling system as recited in claim 1 wherein at least one of said plurality of ribs is generally L-shaped.
4. The cooling system as recited in claim 2 wherein at least one of said plurality of ribs is generally L-shaped.

5. The cooling system as recited in claim 1 wherein at least one of said plurality of ribs comprises a portion that is situated in opposed relation to a front of said motor and a second portion situated in opposed relation to a side of said motor in order to provide said channel for channeling air from said airflow path into said second airflow path.

6. The cooling system as recited in claim 1 wherein said channel defines a first pressure area and said area outside said channel defines a second pressure area, pressure in said first pressure area being lower than said second pressure area.

7. The cooling system as recited in claim 5 wherein said channel defines a first pressure area and said area outside said channel defines a second pressure area, said first pressure area being lower than said second pressure area.

8. The cooling system as recited in claim 1 wherein said plurality of ribs are shaped to define a generally cylindrical area for receiving a front portion of said electric motor in order to create said channel to direct airflow from said airflow path into said second airflow path and toward an inlet of said airflow path, at least a portion of each of said plurality of ribs surrounding said housing.

9. A fan comprising:

a hub having a connector for mounting to a shaft of an electric motor having an airflow path therethrough;

a plurality of fan blades extending radially from said hub such that when they are driven by said electric motor they drive air in a second airflow path in a direction opposite said direction of said airflow path;

a plurality of ribs situated between said connector and said hub; and

said plurality of ribs cooperating with said housing to define a channel for channeling air from said airflow path into a second airflow path of air generated by said plurality of fan blades.

10. The fan as recited in claim 9 wherein housing comprises a front face and a side, at least a portion of at least one of said plurality of ribs being situated in operative relationship with said side.

11. The fan as recited in claim 9 wherein each of said plurality of ribs is generally L-shaped.

12. The fan as recited in claim 10 wherein at least one of said plurality of ribs is generally L-shaped.

13. The fan as recited in claim 9 wherein at least one of said plurality of ribs comprises a portion that is situated in opposed relation to a front of said motor and a second portion situated in opposed relation to a side of said motor in order to provide said channel for channeling air from said airflow path into said second airflow path.
14. The fan as recited in claim 9 wherein said channel defines a first pressure area and said area outside said channel defines a second pressure area, a first pressure at said first pressure area being less than a second pressure at said second pressure area.
15. The fan as recited in claim 14 wherein said channel defines a first pressure area and said area outside said channel defines a second pressure area, a first pressure at said first pressure area being less than a second pressure at said second pressure area.
16. The fan as recited in claim 9 wherein said plurality of ribs are shaped to define a generally cylindrical area for receiving a front portion of said electric motor in order to create said channel in order to direct airflow from said airflow path into said second airflow path and toward an inlet of said airflow path.
17. The fan as recited in claim 9 wherein said plurality of ribs directs air radially across a face of said electric motor and into said second airflow path which directs air axially across a side of said electric motor.

18. A method for cooling an electric motor, said method comprising the steps of:
providing an electric motor having an airflow passageway; and

situating a fan comprising a hub for mounting on a shaft of said electric motor,
said hub cooperating with the casing of said electric motor to form a low pressure
area that communicates with said airflow passageway to facilitate airflow through
said airflow passageway.

19. The method as recited in claim 18 wherein said method further comprises the
step of:

providing a hub having a plurality of ribs configured to cooperate with a
housing on said electric motor to provide said low pressure area.

20. The method as recited in claim 19 wherein said plurality of ribs are each
generally L-shaped and define a portion situated in opposed relation to a front of
said electric motor and a portion situated in opposed relation to a side of said electric
motor.

21. The method as recited in claim 20 wherein said method further comprises the
step of:

providing a hub that is situated at least partially around the housing of the
electric motor to define said low pressure area.

22. The method as recited in claim 19 wherein said method further comprises the step of :

providing said plurality of ribs so that they are situated at least partially around the housing of the electric motor to define said low pressure area.

23. The method as recited in claim 18 wherein said method further comprises the step of:

addition of a flange that surrounds the motor case that extends in a radial direction.

24. An electric fan for use on a vehicle comprising:

an electric motor having an airflow passageway; and

a fan comprising a hub for mounting on a shaft of said electric motor, said hub cooperating with a cover on said electric motor to form a low pressure area that communicates with said airflow passageway to facilitate airflow through said airflow passageway.

25. The electric fan as recited in claim 24 wherein said hub comprises a hub having a plurality of ribs configured to cooperate with a housing on said electric motor to define said low pressure area.

26. The electric fan as recited in claim 25 wherein each of said plurality of ribs comprise a first portion situated in generally opposed relation to a face of said electric motor and a second portion situated in generally opposed relation to a side of said electric motor.

27. The electric fan as recited in claim 25 wherein each of said plurality of ribs are generally L-shaped.

28. The electric fan as recited in claim 24 wherein said hub is situated at least partially around the housing of the electric motor to define said low pressure area.

29. The method as recited in claim 24 wherein said method further comprises the step of:

addition of a flange that surrounds the motor case that extends in a radial direction.

30. An electric fan for use on a vehicle comprising:
an electric motor having an airflow passageway; and
a fan assembly mounted on a shaft of said electric motor, said fan assembly comprising:

a hub on which a plurality of fan blades are situated for creating an axial air flow over said electric motor; and

said hub further comprising a plurality of vanes to facilitate increasing airflow through said airflow passageway for creating a radial air flow directed toward said axial air flow.

31. The electric fan as recited in claim 30 wherein at least a portion of each of said plurality of vanes is situated in opposed relationship to a front of said electric motor and a second portion situated in opposed relationship to a side of said electric motor.

32. The electric fan as recited in claim 30 wherein at least a portion of each of said plurality of fan blades extend over a side of a casing of said electric motor.

33. The electric fan as recited in claim 31 wherein each of said plurality of vanes is generally L-shaped.

34. The electric fan as recited in claim 30 wherein each of said plurality of vanes comprises a portion situated in spaced radial relationship to a housing of said electric motor.

35. The electric fan as recited in claim 31 wherein at least a portion of each of said plurality of fan blades extend over a side of a casing of said electric motor.

36. The electric fan as recited in claim 31 wherein each of said plurality of vanes comprises a portion situated in spaced radial relationship to a housing of said electric motor.

37. The method as recited in claim 30 wherein said method further comprises the step of:

addition of a flange that surrounds the motor case that extends in a radial direction.